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ORIGINAL ARTICLES.

REFRACTION, ITS DIFFICULTIES AND HOW TO OVERCOME THEM.*

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I DO not hope to bring out in this paper any new method of refraction or present to you any new ideas along this line, but to recall to your minds some methods forgotten or discarded, with a plea for their use *aided* by the newer mechanical devices if the examiner sees fit to employ them.

No one is more ready than I to take advantage of any aids in the advancement of our profession, but I firmly believe that we should give them a fair trial before adopting, and if found wanting, to await their further development. I refer here especially to the ophthalmometer, as you know, a device for measuring astigmatism, and the refractometer, an instrument for measuring any refractive error.

I shall first take up the "Difficulties of Refraction," from which I think that you will see that the second phrase of the subject under consideration, "How to Overcome Them," will deductively follow.

I take the difficulties of refraction to include not only the mere testing for the error, but every condition that bears

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upon the result of the correcting, *i. e.*, testing the muscular balance; the prescribing of lenses and the fitting of the frames.

I believe one of the chief reasons for not obtaining better uniform results is that we are too hasty in arriving at a conclusion. For instance, if a patient comes to many of us with asthenopic symptoms, and after a test of a minute or two we find he has $^{20}/_{20}$ vision, reads Snellen number 1 perfectly, and muscles normally balanced, we are too likely to tell him that it is not his eyes that are causing his symptoms, but some other part of his anatomy. Again, in order to gain time, some are wont to be satisfied with the first lens that gives his patient $^{20}/_{20}$ vision, when by changing the axis five or ten degrees, or by increasing the strength one-fourth or even one-eighth dioptre, the print will be more clear-cut. It is very often these very slight differences in degree, which seem trifling, that gives the nervous patient, or the one that uses his eyes for near-by constantly, the result that some one else has failed to obtain.

Some of the troubles that confront us as regards patients are, how to refract. First, children too young to read or to reason with; second, imbeciles; third, insane; fourth, patients with nystagmus; fifth, patients after cataract extraction, or any patient whose intelligence is below par, and bed-ridden patients.

A few of the difficulties as to methods are: First, we place too much reliance on one test or one form of testing. Especially is this true of the ophthalmometer, optometer, refractometer, or any mechanical device for correcting errors of refraction.

Second, we neglect entirely or rely upon one test for our investigation of the muscles.

Third, we pay too little attention to the fitting of the frames.

I believe I can make myself better understood, and not miss any detail, by relating briefly the various steps that I pursue in cases of refraction. I make it a rule that every patient who comes into the office complaining of symptoms that require refraction is subjected to a homatropine test, unless contraindicated by disease, even if it is no more than prebyopia, even in very advanced age.

I first make careful record of the patient's business, age, symptoms, general health, especially as regards his digestive apparatus, his vision for far and near, the latter including far and near point, and his muscle balance. After instilling a drop of 2 per cent. of hydrobromate of homatropine every five minutes for eight times, I am ready for refraction. I first make a careful ophthalmoscopic examination of the fundus and a record of the same. Next a shadow test, using a concave mirror (whether a plain mirror or concave lies with the oculist, the same results being obtained by either), which tells me the following: First, whether there is myopia or hypermetropia; second, whether there is defect requiring a plain spherical, a plain cylindrical or spherocylindrical or cross-cylinder lens; third, the axis of the astigmatism if present, and fourth, one is enabled to estimate the *amount* of the error within 0.50 dioptres if he has used the test faithfully.

What a wonderful advantage over the optometer, which is not accurate and cannot be relied upon at all, since in the first place it measures only the corneal astigmatism and varies in that from 0.25 to 0.50 dioptres in strength, and from 5 to 15 degrees in axis, does not measure plain spherical defects, in mixed astigmatism cannot know which is the plus or minus defect, cannot be used in class of cases above mentioned, *i. e.*, children, imbeciles, nystagmus, insane, etc. At best it is only an aid, and only a very poor aid at that, on account of its unreliability. In my judgment, as soon as a test varies, just so soon it is well to discard that for one that you can trust.

After the shadow test in ordinary cases I use my trial frame and lenses. It is just at this point that we have success or failure in our result, according to whether we are careful or careless. If I can get $^{20}/_{20}$ vision without difficulty I alternate back and forth with one-fourth or one-eighth dioptre lens, adding to and subtracting from, shifting my axis one or two degrees in order to find lenses or axis that will make the letters appear more clear-cut, although they may see $^{20}/_{20}$ with any of them. If the patient is in doubt as to which one of the two or three lenses is the clearest, I come back to the shadow test and let that decide for the patient.

If, again, you have almost $^{20}/_{20}$ vision and there does not

seem to be any lens which will give a better result, the shadow test will come to your aid again and show you that what result you have is the best that can be obtained, or will show you what change to make. After having finished the refraction with the lenses I invariably make a shadow test, and if shadow is not neutralized I put in the lens that will neutralize, and if the patient will accept that I enter that correction in my book instead of the one first found.

Let me put in a word of caution at this point: If the patient does not accept your shadow correction do not rely on it, for it is not infallible, and is only an aid to your work and bears out the statement that I formerly made, that one must not rely on any one test.

The real value of the shadow test is found in those cases in which you must rely upon objective tests alone. You can neutralize the shadow in a few minutes, even if you only get a "snap-shot" view of the fundus as the patient rolls his eyes around. This is the only method that I know of that will give you any more than an approximate result. It is true that the old method of direct ophthalmoscopy will give you some kind of a result, but I have been unable to arrive at any accurate result, for it is impossible with the patient's eye moving in all directions, for me to relax my accommodation for the length of time necessary to focus the optic nerve.

I would not decry the use of the ophthalmometer as an aid for those who are very expert in its use, but I do think it exceedingly bad practice to rely on its results alone, for it varies so much in its results. Neither would I rely upon the shadow tests alone, but the latter in my mind is just as good and a little better, and requires one-tenth of the time. But what in my mind is the test par excellence, is the trial frame homatropine test with the shadow for aid to more rapid work. The homatropine putting the ciliary muscle at rest relieves all spasm of that muscle, and gives us a perfectly quiescent eye in which to focus the rays of light with the lenses. It is only with such an eye, with all possible strain or accommodative function removed, that you can adjust the proper correcting lenses.

After correcting the error I then make a test of the muscles with the full correction on, first testing the internal with the

prisms, beginning with the lowest and alternately test each eye until the patient is no longer able to obtain single vision by whatever concentration he tries. I then try the external recti in the same manner, and then the upper and lower muscles. After all this testing I use the Graefe candle test without red glass, and if there is the slightest insufficiency it will become apparent after the fatigue caused by the former test. It is needless to remark that a careful record of these tests is made for permanent keeping.

After three days or more, for the effect of the homatropine to wear away have elapsed, I check up my original results. I place in the trial frame the full correction and then add to this minus sphericals until the vision of the patient is equal to the vision under homatropine. This, of course, gives me the amount in dioptres of the strain upon the eyes. I next make the muscle test with this correction on, and if this test corresponds in ratio, not in actual prism degree, with the test without correction and the test under homatropine, I pay no further attention to the muscular balance. I now test the near-by vision with full correction on, and if patient is a presbyope I add on plus sphericals according to age.

If patient is one for whom I had to rely upon my shadow test, I take into consideration his age, and making allowance for that, put such correction on and notice by expression of countenance or by acts whether there is any apparent change with lenses on, and if any intelligence is shown at all I add to or subtract from these lenses and note change, but rely principally upon my original examination for calculation as to lenses that should be prescribed.

It is in the prescribing of lenses after you have made your refraction that brings you success or failure. You must decide first whether glasses are for constant use or for near, and how do we decide that? If our patient is a myope he, of course, wants glasses that will enable him to see clearly at a distance. In these cases I always order full correction to be worn constantly if my patient's age is 35 or under, for I believe in exercising the ciliary muscle since nature provided us with one to be used, and not allow it to atrophy from non-use, which it will surely do. I say full correction to age of 35, for I believe that presbyopia begins earlier in myopes. I will

also qualify the above statement by saying that the above applies to near-sightedness of four dioptres or less.

In hypermetropes I decide upon constant use or otherwise by taking into account first, whether the patient suffers from headache due to eye strain; if so, I usually order lenses for constant use; second, the business of my patient. If he has an occupation which requires almost constant application of his eyes near-by, such as bookkeeper, stenographer, etc., I then order full correction for near use, since there is a constant strain on the ciliary muscle all day long, and by relieving that you usually relieve all the symptoms that patient complains of. If the error is so great that after a fair trial he is not relieved, you can then order a separate pair for distance. The age must be taken into consideration in ordering lenses for constant use.

I have been asked frequently, at how early an age do you prescribe lenses? The youngest patient I have prescribed glasses for has been four years, but I should not hesitate to prescribe them at an earlier age if occasion demanded, and by that I mean if I had a case of cross-eye due to the absence of a focus in one eye. Until the age of 14 or 15, I find the nearest to the full correction that you can prescribe is about one-half, and proportionately on until about the 35th year, when full correction can usually be worn with a little difficulty.

In deducting from the full correction for constant use, I place the full correction in the trial frames and then add just enough minus spherical to have the patient read as well as when under homatropine, and then prescribe lenses from 0.50 to 1.0 dioptres stronger. If the full correction is cylindrical, I order full correction cylinder with a minus spherical added to compromise with the ciliary muscle, and do not lessen the cylindrical correction instead, as so many oculists do. I believe you get the best results from correcting all of the astigmatism.

If patients object to wearing lenses all the time, and positively refuse, I compromise on lenses for near use, warning them that they must not expect to get complete relief from such a course.

I often find school children and college students in whom slight defects cause grave symptoms. I order for such ones

full correction, to be worn at study during school days, but to be laid aside at all other times. A careless optician will spoil many an oculist's good work by not centering his lenses; by not taking into consideration whether lenses are for near use or constant—*i. e.*, by not placing glasses at prôper angle; by making patient uncomfortable on account of pressure from nose piece, or have temples too tight; by using too small lenses, so that the patient looks under, over or around except when looking straight ahead. I tell my patients that it is just as important to have the frames fit the face properly and the lenses to rest properly before the eyes as it is to get the proper glass for the eyes. I always request my patients to bring their glasses to me before wearing them, so that I may see if the frames fit and the lenses are according to the order, and then I am responsible if they do not give results. I have every one of my patients wear spectacle frames if possible, and I discourage the use of bifocals. I always transpose my cross cylinders to spherocylinders, so that the patient will have as large a field as possible. The new Toric lenses will obviate that necessity in the future. In regard to the Torics, they are very much of an improvement over the old style in spherocylinders, and will prove of especial advantage with patients with long lashes or prominent eyes. Do not, however, prescribe Toric lenses in eyeglass frames, for it is practically impossible to center them accurately, and if this is not so they do more harm than the increased field can do good.

I have talked at length on the uncomplicated cases of refraction, *i. e.*, those that do not contraindicate the use of homotropine.

Those cases of glaucoma, adhesion of iris from former iritis, macula corneæ, deposits on lens, beginning cataracts, any disease causing turbidity of aqueous or vitreous, choroiditis, etc., that need refracting, I believe the neutralizing of the shadow by retinoscopy to be not only the most rapid but most accurate.

What shall we say of anisometropia? Dr. Alexander Duane, of New York, in a recent article, concludes that it is best to *try* to correct all cases of anisometropia, and if patient cannot wear correction, then ignore one eye. He ascribes four reasons for failure.

1. One image being indistinct and blurred confuses the vision of the good eye.

2. Glasses correcting defect are too strong. This can be overcome if patient persists in wearing glasses.

3. The prismatic effect of glass, strong enough to correct defect when patient looks anywhere but through center.

4. Muscular deviation cause of patient's inability to use glasses.

I always correct anisometropia according to rules mentioned in the preceding pages. If there is a deviation of one eye or vision is not normal, I have the eye with good vision tied up and require my patient to use the other eye with the correction on for an hour at a time, three or four times a day, if he is under 25 years of age. In children an eye that deviates as much as 30 degrees from non-use can be brought to binocular vision by such a procedure. Vision as low as $^{20}/_{100}$ can be brought to normal by careful, persistent training and changing of lenses nearer to the full correction, as the eye will allow.

Persons in middle life can wear anisometropic correction with ease if vision is normal or nearly so in each eye.

After cataract extraction I do not attempt to refract the operated eye if vision in the other eye is normal or nearly so, for I have never seen a patient yet that could wear correction in which the difference in refraction is so great. I believe this to be due to the fact that the images are of different size, despite the fact that so many are against me. I believe that the images are mathematically different on account of the greater refraction of the rays of light in one than the other, but when the images are projected with a prism the images are the same.

The cases of anisometropia that bother me the most are those of myopia in one and hypermetropia in the other eye. I prescribe usually the full correction myopia and as near as possible hypermetropia with varying degrees of success.

To recapitulate:

1. Use homatropine at all ages, except in aged, unless positively contraindicated by disease.

2. Use shadow test as an aid rather than optometer, on account of its greater speed and better accuracy, but do not

rely upon it unless absolutely necessary, using trial frames and lenses as a final test.

3. Test muscles at least three times, and if proportions are relatively the same that will suffice.

4. Be careful that you take into consideration the temperament, physical condition, age and occupation in prescribing lenses.

5. Always review a pair of glasses after the patient gets them from the optician.

6. If necessary to rely upon one test without the assistance of the patient, the shadow test is the quickest and most accurate test with or without homatropine.

TRANSIENT ASTIGMATISM.*

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INTRODUCTORY to the presentation of this subject, it may not be amiss to refer briefly to the point of normality and frequency of the astigmatic condition, as with some there seems to be a definite relationship between these phases of the subject and its transiency. If we refer to the ophthalmological literature of a few decades past and compare with the views entertained at present, a finer distinction between normality and ametropia will be noted coincident with the increasing strain and pressure of succeeding years and the improved methods of examination.

In the classical essay of Donders,[1] the statement is made that "astigmatism less than 0.75 D. may be considered as normal, astigmatism greater than 0.75 is abnormal, because vision in this condition is generally lowered and the use of cylindrical lenses is often of service." If we consult a more recent author[2] on this subject, the following comment will be found: "Exactly what degree of astigmatism should be considered abnormal has not been agreed upon by observers. Some look upon 0.25 D. as abnormal, while others think 0.50 D. normal. It is impossible to formulate any law of universal application for such a varying and imperfect optical

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instrument as the eye. * * * We feel justified in considering only those degrees of astigmatism abnormal which exceed 0.25 D. We would, however, not deny the possibility of certain rare cases deriving benefit from the employment of glasses of this lower power."

While the above may hold true for patients in general, it does not, in my experience, obtain among those who are compelled to follow prolonged near work. In my clientage, which is drawn largely from the various departments of the University of Michigan, where the extended courses of study tax to the utmost the endurance of many a student, fully one-third of my refraction cases show an error of but 0.25 D. of astigmatism, simple or combined, which I have corrected with none but the happiest of results. Indeed, numbered among this list are many who have been rendered neurasthenic by the presence of even this small amount of ametropia and have regained their health only upon its correction. While I have found it necessary to correct smaller errors of astigmatism in only a few instances, in correspondence with several ophthalmologists of national reputation upon this matter, I find that many agree upon 0.25 D. of astigmatism as being abnormal; and one in particular offers the following comment: "It often happens that 0.12 D. of astigmatism is of no importance and need not be considered, but in a very considerable number of cases the patient will not be fully benefitted unless this small degree is corrected." It will suffice to say, in conclusion, upon the point of normality, that before harmony of result is obtained the visual, motor and sensory parts must be relieved of all unnecessary strain and irritation; and to accomplish this, the individuality of each case must command our attention; for there is an art in refractive work as well as a scientific aspect.

Illustrative of this advancement that has been made in recent years in the recognition and correction of ametropias, I cannot offer a more fitting preface to my brief consideration of the frequency of the astigmatic condition than the words of Dr. Julian Chisholm:[3] "I often wonder what has become of the host of hyperopic eyes that I formerly saw and treated with spherical convex lenses. That I see the same character of eyes now I am quite sure, but no longer from the same

standpoint. A more careful examination proves these cases to have been mild grades of astigmatism, often myopic. The same class still comes to me from other specialists, who are holding the views that I formerly acted upon before I found out my mistake." That there are some to whom experience has not yet revealed these facts is almost daily demonstrated in my practice, where I find that many patients are wearing glasses for the correction of an hyperopia when, in fact, both subjective and objective tests show a simple or compound hyperopic astigmatism; and, if the latter variety has been recognized, the lenses prescribed are usually too strong in their spherical power, with a corresponding deficiency in the cylindrical refraction. This inaccuracy of result is due in many instances to an improper mode of procedure, which I regret to say finds recognition in a few works on refraction. The examiner is directed thusly: "With the accommodation suspended by a cycloplegiac, spheres are employed so long as vision is improved, and if normality of sight is not attained thereby, the determination of astigmatism is indicated." Unmindful of the fact that a sphere will improve vision in astigmatism up to about one-half of the measure of the error (although this fact is often stated conversely in works on refraction), it is not surprising then that the devotees of this method, unaided by objective tests, should entertain a belief in the correction of an "induced transient astigmatism" to explain the frequency of our astigmatic findings, which statement I have frequently heard. While an examination into the history of my private cases shows that 89 per cent. of this number are astigmatic, I am confident that this percentage is in keeping with thorough, conscientious refractive work, as it finds corroboration in the experience of several eminent ophthalmologists with whom I have corresponded regarding the subject. From a paper devoted to the "Study of the Refraction of Seventeen Hundred Eyes," by Ellis,[4] I take the liberty of quoting the following statements: "Of the 1,700 eyes whose refraction was measured, 1,434 (85 per cent.) were astigmatic." "In 72 per cent. of all the astigmatic eyes the error was less than 0.75 D." Four hundred and ninety-four of the eyes had only 0.25 D. of astigmatism, and yet I found it both wise and expedient to correct the

greater number of these small errors." In his excellent treatise on School Hygiene, Risley[5] tells us that out of 2,628 cases. 90 per cent. were astigmatic.

Not deeming it necessary to dwell longer upon the frequency of the astigmatic condition, believing that a discussion of the subject will bring forth many interesting facts, a résumé of the literature at hand upon the subject of transient astigmatism may not prove uninteresting. Under the caption of "Physiological Astigmatisn," Thorington[6] presents the following facts: "This is due to lid pressure, or temporarily to extreme pulling or contraction of the extraocular muscles. It is a voluntary astigmatism, and therefore not constant. It is not a condition of all eyes. The writer has demonstrated with the retinoscope and the ophthalmometer that the condition can be produced in eyes not otherwise astigmatic. Drawing the lids together in the act of squinting or frowning, the patient can press the cornea from above or below and give the horizontal meridian of the cornea a longer radius of curvature and the vertical meridian a shorter radius, or with the eye looking into the telescope of the ophthalmometer, no overlapping of the mires is noted, but in some instances when told to open the eyes widely and 'stare' into the instrument, as much as ½ to ¾ a diopter of astigmatism may be recorded."

"It is not rare," says the late Dr. Noyes,[7] "to discover, as Laquer pointed out, that the curve of the cornea is not constant. It sometimes changes as we look at it, because the images approach or separate instead of remaining still. They exhibit these oscillations under the action of the lids, and also if the upper lid is lifted off the globe, under the action of the motor muscles. Drawing on the lids at the outer angle will increase the corneal curvatures greatly, hence we have an explanation of the uncertain findings in some cases of astigmatism apart from spasm of accommodation."

In his excellent work on ophthalmometry, Davis[8] offers the following: "In a few cases the recti muscles can by voluntary action alter the corneal astigmatism. I have reported one such case in the *Manhattan Eye and Ear Hospital Reports*, January, 1895, where the patient had a corneal astigmatism with the rule of 0.50 D. which he could, by voluntary

action of the recti muscles, increase to 2 D. in the right eye and to 1.50 D. in the left eye. When under a mydriatic he could still increase the astigmatism in the right eye to 1.50 D. and in the left eye to 1 D. The lids were held from the eye so they could have no influence."

Lautenbach[9] in a paper "On the Local and General Conditions that Change Corneal Curvatures," makes mention of the action of the ocular muscles, lid pressure, segmentary contraction of the ciliary muscle, in conjunction with certain dyscrasias in their weakening effects upon the substance of the cornea, as productive of temporary alterations in the curvatures of the cornea, and also makes evident that many heterophorias are due to an effort on the part of the extra-ocular muscles to ameliorate the astigmatic condition present.

Aside from the statement of Davis, we are led to infer from the above that transient modification of the corneal curvatures is of common occurrence, and would accordingly complicate our refractive work markedly. That many cases in which a wavering of the mires is noticed are not instances of a transient astigmatism is attested by De Schweinitz[10] in the following comment: "Nothing is more common than to see the mires separate and overlap again, so that the apparent curvatures of the cornea seem to change while under observation. This change is due to slight movements of the eye which bring different portions of the cornea into view. It is difficult for most patients to remain long in the required position before the instrument, and hence the reading should be rapid as well as accurate."

Although the varying positions of the mires have commonly been observed in my use of the ophthalmometer, the indicated transient astigmatism has found but rare corroboration in the employment of the retinoscope and the subjective tests. Thus the thought occurred to me that aside from the instances which De Schweinitz cites, possibly this apposition and recession of the images might obtain its origin, in many cases, in the eye of the observer. A thorough investigation into the possibilities of the action of the accommodation upon the position of the mires revealed the truth of my supposition. Oscillations of the targets may be observed when an artificial cornea is employed, providing the accommodation is active.

For instance, the mires are placed in apposition with the eye focused sharply at the point of contact. If the eye is now adjusted for infinity; or, in other words, the accommodation is suspended, the mires separate and remain in this position with relaxation of the eye, but on fixing the mires they return to contact. With the use of a greater amount of accommodation, the images overlap. As a further demonstration of the effects of the adjustment of the eye upon the movement of the mires, the following experiment was performed by the aid of fifteen patients, mostly medical students, whose training would fit them for the test. Their eyes, as viewed through the ophthalmometer, showed in each instance an apparent variability in the amount of astigmatism. They were then instructed to examine both my eye and the artificial cornea when a similar wavering was recorded. Preparatory to a refraction of their eyes a cycloplegiac was employed, and when the accommodation was thoroughly suspended the patient again viewed my eye and the artificial cornea when no oscillation of the mires was noted, except in one instance. In order to substantiate these findings, both my associate and myself passed through the ordeal of mydriasis with a corroboration of the facts recorded above. Had there existed the transient astigmatism which each of us apparently possessed, a recession and apposition of the images would have obtained even under the action of the cycloplegiac, unless it were due to a segmentary action of the ciliary muscle, which condition is probably rare.

From these experiments it is evident that in order to secure accurate readings in ophthalmometry a certain degree of skill and familiarity with the limitations of the instrument is imperative to keep the eye nicely adjusted at the point of contact of the mires. A correction of the examiner's ametropia, especially of the astigmatic variety, should receive attention, as it is difficult to control the accommodation under these conditions. Another point should be made evident to the student: Care should be exercised to hold the head perfectly steady during the examination, as a movement of the head will produce an apparent transient astigmatism by directing the vision through the periphery of the eye-piece, with its resulting prismatic displacement of one or both of the images.

A fact which I wish to make prominent is that, in my experience, with rare exceptions, an oscillation of the mires can be traced, either to a movement of the eye of the patient during examination, thus presenting different portions of the cornea to view, or to an accommodative effort on the part of the observer. I would, however, not have it understood that action of the lids and the extra-ocular muscles may not produce a transient modification in the curvatures of the cornea; for a few instances have come under my observation illustrative of this condition; but among the 1,200 cases which I examined only two patients exhibited enough transient astigmatism to complicate their refraction. In each instance there was a spasmodic variability in the visual acuity, ever under the action of a cyclopediac, 1.00 D. of transient astigmatism being recorded in one case by the ophthalmometer and substantiated by subjective tests. This instance was unilateral, and produced by spasmodic action of the lateral recti muscles.

In conclusion, I wish to make mention of the following phenomenon, which I have heard discussed as an evidence of the existence of a transient astigmatism. It is occasionally observed that after an ametropia is corrected the patient will state, while looking at the astigmatic chart, that the line upon which the attention is fixed becomes more distinct than the rest of the radiating lines. This may occur with or without a cycloplegiac, and is due to the presence of small degrees of over or undercorrected astigmatism, together with an active accommodation. Many such cases have come under my observation, but are always regarded as an evidence of an incomplete suspension of the accommodation, which is fully demonstrated by further instillations of the cyclopegiac. In my opinion, to prove the existence of a transient astigmatisms it requires not only the apposition and recession of the mires, but a variability of the visual acuity with the accommodation thoroughly suspended, corroborated by the findings of retinoscopy.

As a closing word, I wish to say that I am an ardent supporter of ophthalmometry, as it presents many facts of practical and scientific interest which other means of examination fail to make evident, but unless we understand thoroughly

the limitations of the method and possess the necessary faculty of accommodative control, the findings of ophthalmometry will confuse rather than aid us in refractive work.

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DISCUSSION.

Dr. Suker, Chicago.—I cannot believe and would rather not believe some of the experiments that Dr. Lautenbach, of Philadelphia, has undertaken to prove, that the extra-ocular muscles by contraction or relaxation produce astigmatism. Nor can I believe that any constant extra-ocular pressure will produce astigmatism without injuring the integrity of the cornea. This, for the simple reason that the cornea is so constructed physiologically as to successfully combat any pressure that might result either from the lids or from the extra-ocular muscles. Certainly if any amount of astigmatism is produced it must be exceedingly small, and I should sincerely doubt an astigmatism of one diopter had ever been so produced, for this would mean a change in the length of the corneal radii equivalent at least to 1 mm. This change, then, would mechanically destroy the transparency of the cornea as the result of infiltration due to this excessive change in the curvature. This rough sketch (draws on blackboard) will demonstrate that the fibres of the cornea do not only run parallel, but diagonally, and at right angles, and are thus able to cope with any pressure that might be exerted upon them. You can demonstrate astigmatism in any eye, whether under a cyclopegic or not, for the simple reason that the cornea is not a section of a perfect sphere. The ophthalmometer is not a reliable instrument, though it is a good guide. It fails to demonstrate or bring forth any lenticular astigmatism, though the majority

of the cases are corneal. Yet we know that a small percentage are lenticular, another portion are cornea-lenticular. In these latter two classes the ophthalmometer will always fail to demonstrate even the slightest amount of astigmatism. Hence if it fails in a certain percentage of cases, it cannot be claimed to be a reliable instrument for all cases that come under the head of astigmatism in general.

Dr. Vail, Cincinnati.—This subject has always been more or less of a bugbear to ophthalmologists. The subject of refraction is one of which much has been written and many diagrams have been published in the books. When we are students, and before we ripen into mature doctors, we are inclined to turn the pages of the book to begin at the first page on the subject of optics and start in as if we were going to digest the whole thing. We go through a page and we find on the next an illustration of the rays of light passing through a prism, and we are told they are refracted towards its base, and we read of the parallel lines, and we turn again a page and we find angle A, B, C and D, and we find divergence, and we turn a page and find a picture, and we forget what it was about, and we slam the book shut and take up a trial case. This is more satisfactory and the patient helps you by telling you: this is better and that is worse. We have been through the study of physiological optics, and we understand more of it than the fresh student who takes it up in connection with medical work. So we study the transposition of lenses, and what is the effect of laying a spherical lens in front of a cylindrical lens. Then there is the shadow test. This test, employed in the proper way, is of wonderful service. I used the ophthalmometer for six months. It is only a convenience. The ophthalmoscope is the best thing. That is the instrument I work with together with the shadow test. This may be a very dry subject, but if well understood and appreciated it, is an exceedingly wet one. We have to work at it faithfully to understand it, but when fully appreciated it is just as interesting as operative ophthalmology.

Dr. Bradfield, La Crosse, Wis.—About five years ago I was consulted by a young girl with severe reflex headache. The family physician had exhausted all the remedies without effect. She was 14 years of age. I examined the eyes care-

fully, and found no error of refraction. Vision about $^{20}/_{30}$. The ophthalmometer showed no astigmatism. Retinoscope showed refraction about normal. I tested her refraction under homatropin, being satisfied there was no trouble; and again in two weeks, with the same result. I advised rest, and the headaches became less severe. In less than a year, her father having failed in business, it was necessary for her to go to work. I again examined the eyes, and found one diopeter of astigmatism according to rule. Glasses gave her perfect satisfaction, and the headaches disappeared. One year later she came, and said she had the same headaches. The ophthalmometer showed two diopters of astigmatism. I found that the two diopters gave her again perfect vision for two years. Then, when she again had some headache, I found three diopters in the right and three and one-half in the left. I examined her with a cyclopegic, and afterwards with the ophthalmometer and by the retinoscope, and these are the changes that have taken place in her eyes.

Dr. Miner, Springfied, O.—I have nothing to say about my own paper, but would like to say about Dr. Griffin's paper that I do not believe in physiological astigmatism. You may force upon a patient an astigmatic lens if he is ametropic, and he may still have V. $^{20}/_{20}$, but it depends upon the occupation whether an astigmatism of one-half or one-fourth diopter gives trouble. A person with an out-door life will not be troubled with one-half at all. If this person goes to a city and attempts to study or occupy his time with reading or writing, as a book-keeper, a student, etc., then his one-half diopter will no doubt give him a good deal of trouble. As to the ophthalmometer, I do not use it, for the reason that it is not reliable. I use the shadow test, and find it tells me just as much as the ophthalmometer. It takes less time, and is more accurate; but I do not rely upon the shadow test entirely.

Dr. Griffin (closing discussion).—In reference to Dr. Suker's point, I do not think our ideas are so far apart as he thinks. I believe that the ophthalmometer is simply indicative. That is all I claim for it. I do not claim we ought to prescribe lenses according to what we find by the ophthalmometer. It simply indicates what the curvature of

the front of the cornea is, from which we may draw certain conclusions. It simply gives us the corneal curvature and the axis of its astigmatism. I, too, use the shadow test, and I agree with everything Dr. Vail has said. As Dr. Jackson has pointed out in his work on diseases of the eye, when speaking of trial lenses, we should secure all the evidence by all methods at our hand.

RESECTION OF THE CERVICAL SYMPATHETIC GANGLION—ITS PRESENT STATUS.

Wilbur B. Marple (*Medical Record*, May 10) from a study of eighty-six reported cases, draws the following conclusions:

1. That the operation of extirpation of the sympathetic ganglion is a safe procedure in the hands of a skillful surgeon.

2. That (as Ziehe says), while the material is not yet sufficient to reach a positive conclusion as to the permanence of its effect, it is nevertheless established that some of the glaucomatous cases have been improved for some months by resection; in others the condition apparently remains stationary. The results have varied, and one cannot yet be sure in what cases it can be advantageously employed. It at least, apparently, does no harm. A considerable number of favorable results have been reported in chronic irritation or inflammatory glaucoma, as well as in simple glaucoma, in which, oftentimes, pain is abolished.

3. It does not replace iridectomy, but may possibly supplement the latter, in case it is refused or has already resulted disastrously in the other eye, or is contraindicated, as in hæmorrhagic glaucoma, dacryocystitis, etc.

4. Until our cases are observed more carefully and for a longer period of time, it will be impossible to arrive at positive conclusions as to the indications for the operation or as to its permanent results.

MEDICAL SOCIETIES.

FIFTY-THIRD MEETING OF THE AMERICAN MEDICAL ASSOCIATION.*

Held at Saratoga Springs, N. Y., June 10 to 13, 1902.

SECTION ON OPHTHALMOLOGY.

FIRST SESSION.

Address of the Chairman.

Frank Allport (Chicago) said that he thought it was quite unnecessary to assure his colleagues how much he appreciated the honor of being permitted to preside at the meetings of this section, which he considered the representative association of ophthalmologists in this country, and the chairmanship of which he regarded as the highest gift of American ophthalmologists, because no taint of political manipulation had ever sullied its reputation. In the program of the present meeting the endeavor was to have a few subjects systematically and thoroughly treated rather than to treat a great variety of topics. The officers were much gratified at being able to announce that owing to an invitation extended to Professor Haab, of Zurich, Switzerland, he had traveled from that distant country expressly to deliver an address before his American colleagues in this section, and in behalf of the section he bade the Professor welcome and extended to him the privileges of the floor.

The Treatment of Serpiginous Ulcer of the Cornea.

Charles J. Kipp (Newark, N. J.) said that twenty years had now passed since he first observed that certain cases of serpiginous ulcer of the cornea in which no further progress was noticed after they came into his hands, presented the following features and healed under very simple treatment: From the margin of the ulcer straight lines diverge in all directions through the parenchyma of the deepest layer, not giving off

*American Medicine.

branches, and the further ends of which lines are connected by grayish intermediate striæ; if present all around, these intermediate lines form a distinct ring, and if the ulcer is situated in the center of the cornea with these striæ well developed, the appearance might be compared to a spider's web. He considered that ulcers presenting this appearance had ceased to be progressive and that no treatment involving further destruction of tissue should be used. When blenorrhea of the sac is present he splits the canaliculus. The only treatment required is warm fomentations and instillation of a mydriatic. When these linear opacities are not present he uses the galvanocautery and iodoform powder; if there is much pain, abstraction of blood from the temple; flourescin is used to determine the extent of the ulcer before using the cautery; if tension is high he perforates the floor and sometimes does paracentesis of the corneal margin, but prefers perforation with the cautery. The writer spoke of the hope held out by Dr. Roemar that we shall soon possess a serum which will arrest the progress of the pneumococcic ulcer when injected subcutaneously or applied locally.

Discussion.—De Schweinitz (Philadelphia) said it was unfortunate that the name serpiginous ulcer was used, as it gave a wrong idea of the disease; it was his practice to make his treatment agree with the bacteriologic conditions; in the absence of virulent infection he curetted and used bichlorid; in virulent infection he used the actual cautery, tincture of iodin, or carbolic acid; blenorrhœa of the sac was treated by splitting the canaliculus and use of protargol.

Jackson (Denver) had used with decided benefit an application of nitric acid, and seen rapid improvement follow its use, even in the pneumococcic infections—a 20 per cent. to 50 per cent. solution.

Wilson (Elizabeth, N. J.) had had some experience with these ulcers and could endorse what Kipp said, that when one sees these striæ one can make up his mind that the infection will extend no further.

Connor (Detroit) said that a new remedy for the destruction of infectious germs had recently been introduced by Dr. Novee, which in solutions as weak as 1:10,000 destroyed gonococci in a few minutes without irritation, and said from

the small experience he had had with it he thought it a useful agent.

Haab (Zürich) said he preferred to destroy the microbe directly by use of pure carbolic acid.

Randolph (Baltimore) called attention to the superiority of holocain over cocain as an anæsthetic in these cases prior to cauterization, and also that carbolic acid had anæsthetic properties itself.

Risley (Philadelphia) also emphasized the value of holocain, and preferred to use a double strength tincture of iodin.

Wilder (Chicago) agreed with Risley as to the value of iodin, and had dispensed with the cautery in many cases.

Taylor (Wilkesbarre) had come to use the cautery more and more, and also used a strong solution of silver nitrate.

Friedenwald (Baltimore) was somewhat suprised to hear the tincture of iodin spoken of so highly, as he had been very much disappointed in its use; he thought it invaluable for dendritic or other superficial ulcers, but had given up its use in infected ulcers.

Hiers (Savannah) used the tincture of iodin, curetting thoroughly before its application.

Greenwood (Boston) added his testimony to the usefulness of iodin, and also of iodoform powder, and said the cases were often benefited by the use of mercury.

The Nature and Treatment of Pterygia.

John O. McReynolds (Dallas, Texas) said that Professor Fuchs speaks of pterygia being peculiar to those past middle life, but that while that might be true of Vienna it was not true of the Southwesten part of the United States. He attributed the cause to heat and dust with high winds, and said it was not infrequent to see boys with pterygia; those living in the warm, dry and dusty regions were the ones who most frequently developed the growth. When the evaporation of the tears is so rapid that they do not accumulate in sufficient quantity to wash away the foreign particle, the conditions for development of pterygia were present. He described his method of operating which had given the most satisfactory results, and consisted of subconjunctival anteroinferior fixation.

Discussion.—Savage (Nashville) agreed with McReynolds as to etiology of pterygium, and did not believe pingueculæ were ever transformed into pterygia; he believed all these growths were due to foreign bodies imbedded in the cornea, the bodies being too small to be noticed at the time; the process is one of ulceration, the extension bringing about changes in the epithelium, then the conjunctiva becomes swollen, the limbus overlapping the cornea and becoming adherent to the base of the ulcer; men who are exposed in sandy countries are the most frequent sufferers. He had done the McReynolds operation more than a hundred times with only 2 per cent. of failures.

Wood (Chicago) endorsed what Savage said of the operation, and said a most important thing was the excellent cosmetic effect; that after the operation one cannot tell that it has been done. He said that one of the chief factors was heat, as in their part of the country, although there was much wind and dust, the moist atmosphere prevented the frequent occurrence of trouble.

Jackson (Denver) emphasized what the other men had said as to the value of the operation.

Holt (Portland) and Suker (Chicago) had also used the operation with success.

Thiosinamin in Corneal Opacities.

Geo. E. Suker (Chicago) referred to the use of thiosinamin as a resolvent of cicatricial tissue in the removal of keloids, lupus, urethral strictures and rheumatic joint-affections, which led to experiments to determine its efficacy in ophthalmic practice. It is an active alterative, belonging to the same group as potassium iodid and mercury, and its use is indicated in corneal opacities from any cause, cicatricial contraction of the lids, exudative choroiditis, symblepharon, capsular opacities, and cicatricial ectropion. Experiments were made to determine whether it would prevent the maturing of cataracts, but no results of value were obtained. The best mode of administration is in three-grain capsules once or twice a day. After the patient has been taking it for five or six days it is well to intermit a week or ten days. It is a

marked tonic, favors absorption of exudates, clears up corneal nebulas, and produces local reaction without systemic disturbance.

SHERMAN (Cleveland) had used it in a case of interstitial keratitis in which the vision was reduced to $^{20}/_{100}$, and, after using the drug in one-grain doses t. i. d. for a year, the vision was improved to $^{20}/_{40}$; he had reported 33 cases of its use, with marked benefit in each case, and was of the opinion that it is a valuable remedy, especially in cases of a vascular character.

Discussion.—RANDOLPH (Baltimore) alluded to its use in tinnitus, in which class of cases he had found it of benefit, given in half-grain doses t. i. d.; in some cases it had produced distressing vertigo.

SUKER, in closing, said the tendency to vertigo would be overcome by its continued use, and he had not had a patient who could not take three-grain doses.

SHOULD THE GENERAL PRACTITIONER HAVE A WORKING KNOWLEDGE OF THE OPHTHALMOSCOPE AND TRIAL LENSES?

A. R. BAKER (Cleveland, O.) considered that it was possible for the average medical student to gain a working knowledge of the instrument in the time allotted him. Twenty years ago that was not so, but the student now enters the medical school having learned how to study, and comes to his senior year with a trained mind, trained eye and trained hand; it is the exception that one of them does not see the fundus the first time he takes the instrument in his hand and is able to make a drawing of what he sees, and they gain a good practical knowledge of its use before they graduate.

TEACHING OPHTHLMOLOGY TO UNDERGRADUATES.

F. C. TODD (Minneapolis, Minn.) said he considered the subject under the two heads—didactic teaching and clinical work; there should be text-books adapted to the student's needs, from which lessons could be given; the most valuable method is clinical teaching, where a series of cases can be presented for illustration. Laboratory work should be taught

the student before he comes into the clinic; he believed there were certain portions of ophthalmology essential to the general practitioner, as the differentation between glaucoma and iritis. He thought that while formerly too little attention was paid to the specialties, we were now going to the other extreme.

Discussion.—BURNETT (Washington) thought the less the general practitioner had to do with the ophthalmoscope the better, because ophthalmoscopy is an art by no means easy to learn, and one that requires constant practice, and "a little knowledge is a dangerous thing." To be of real value, the intrument must be used by an expert.

WOOD (Chicago) said they had given up operating before large classes, and preferred to teach by use of a projecting apparatus, insisting that the student should understand the eye symptoms of disease as thoroughly as any other symptoms.

WILDER (Chicago) was in accord with the views of Baker, that the general practitioner should have a good knowledge of ophthalmoscopy, and described in detail the method of teaching at the Rush Medical College, which consisted chiefly of practical instruction in the clinic.

JACKSON (Denver) thought that ophthalmoscopy should be considered a very important branch in the education of the general practitioner, and that it was being too much neglected. He considered it just as important as the teaching of microscopy.

SUKER (Chicago) thought that a student, before he is graduated, should be able to describe the normal fundus if nothing else; he should be able to appreciate the variations in the normal fundus.

CONNOR (Detroit) thought the students should be taught ophthalmoscopy, if only to let them see that there was something absolutely certain in medicine.

KNAPP (New York) did not think any retrograde movement should be encouraged in this respect; that in Vienna one could not get a license to practice medicine without passing an examination in ophthalmoscopy, and that we, as a progressive country, would soon have the same requirements.

CRUM (Utica) thought that teaching ophthalmoscopy properly would cause the general practitioner to fully appre-

ciate the skill required, and enable them to send their cases to the oculist at the proper time.

CARMALT (New Haven) thought the discussion really belonged to another department, as the ophthalmologists themselves were practically all agreed on the importance of the proper teaching of the subject.

ALLPORT said that in his teaching he used the papier maché eyes, and found them of great aid.

In closing, BAKER said that the student could be taught to use the ophthalmoscope in just as short a time with the dilated pupil as with the papier maché eyes.

(Continued next issue.)

PROGRAM OF THE THIRTY-EIGHTH ANNUAL MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY.

Held on Wednesday and Thursday, the 16th and 17th of July, at the Pequot House, New London, Conn.

1. A New Eye Speculum. Dr. F. D. Skeel.

2. The Post-Operative History of Fifty Cases of Simple Chronic Glaucoma. Dr. C. S. Bull.

3. Notes on Some Cases of Simple Chronic Glaucoma Treated by Resection of the Superior Ganglion of the Cervical Sympathetic, with Sections of Ganglia. Dr. J. E. Weeks.

4. A Case of Endothelioma of the Orbit. Dr. C. A. Veasey.

5. Melano-Sarcoma of Orbit, with Microscopic and Macroscopic Specimens. Dr. S. B. St. John (Pathalogical Report by Dr. A. J. Wolff).

6. Report of Case of Congenital Orbital Cyst, with Microphthalmus. Dr. G. C. Harlan.

7. Ossification of Choroid, with Report of Four Cases and Résumé of Literature to Date. Dr. B. L. Millikin (with assistance of Dr. J. C. Darby).

8. A Case of Metastatic Carcinoma of the Optic Nerve, with Peculiar Degenerations of Both Nerves—Clinical and Pathological Report. Dr. Ward A. Holden.

9. A Case of Double Metastatic Carcinoma. Dr. E. E. Jack (Pathological Report by Dr. Verhoeff).

10. A Case of Cavernous Sinus Thrombosis. Dr. E. E. Jack (Pathological Report by Dr. Verhoeff).

11. The Conjunctival Flap and Cataract Wound. Dr. F. M. Wilson.

12. Case of Delirium Tremens following Cataract Extraction. Dr. T. R. Pooley.

13. Death from Diabetes After Cataract Extraction. Dr. T. R. Pooley.

14. Some Recent Experiences with Sub-Conjunctival Injections in Orbital Disease. Dr. C. S. Bull.

15. Report of Examination of Eyes of Children in Public Schools of Memphis. Dr. J. L. Minor.

16. A Simple Use of the Circle of Diffusion in the Correction of Ametropia. Drs. Wm. Thomson and A. G. Thomson.

17. The Use of Models in the Teaching of Ophthalmology, Especially as to Refraction and Convergence. Dr. B. A. Randall.

18. On the Insertions of the Ocular Muscles. Dr. L. Howe.

19. The Ideal Result to be Kept in View in the Operative Treatment of Convergent Strabismus in Children. Dr. S. Theobald.

20. A Note on the Ophthalmoscopic Variations in the Normal Fovea. Dr. H. T. Hansell.

21. On the Confusion of Methods in Using Prisms. Dr. L. Howe.

22. Additional Notes of a Case of High Astigmatism. Dr. B. L. Millikin.

23. A Case of Unilateral Temporal Hemianopsia in which the Wernicke Hemianopsia Pupillary Reaction was Present. Dr. C. J. Kipp.

24. Two Cases of Detachment of the Retina Traumatic in Origin, Treated by Drainage Incision. Dr. W. K. Rogers.

25. A Methyl-Alcohol Debauch and Its Results. Dr. H. W. Ring.

26. Several Cases of Unusual Eye Disease. Dr. J. H. Claiborne.

27. A Case of Vicarious Menstruation from the Lower Lids. Dr. J. H. Claiborne.

28. Histologic Study of the Lenses of a Hanged Criminal. Dr. C. A. Oliver.

29. Study of the Ocular Changes Produced by the Injection of Pure Cultures of the Bacillus Typhosus into the Vitreous Chamber of Rabbits and Guinea Pigs. Dr. C. A. Oliver.

30. The Extraction of Steel from the Vitreous Chamber. Dr. S. D. Risley.

31. The Value of Partial Resection of the Tarsal Cartilage in the Operative Treatment of Congenital Ptosis. Dr. E. Gruening.

32. Circumscribed Exudative Choroiditis. Dr. H. Friedenwald.

33. On Improvement of Vision in Amblyopia. Dr. H. Friedenwald.

INFANTILE OPHTHALMIA.

E. Treacher Collins (*The Practitioner*, London, April 1) summarizes the measures which at the present time are best qualified to reduce the amount of blindness in ophthalmia neonatorum, as follows:

1. Compulsory notification of cases of ophthalmia neonatorum by all persons attending women in labor other than medical men.

2. Instruction as to the importance of the universal adoption of prophylactic measures (preferably Credé's method, or the use of a sublimate solution, 1 in 2000, or protargol 20 per cent.) by all lecturers and writers of text-books on midwifery.

3. The appointment of ophthalmic surgeons to maternity institutions, more especially those which provide for attendance of women at their own homes.

4. The provision in all midwifery bags of a drop bottle labeled "drops for the eyes."

5. The better training of monthly nurses in the methods of aseptic cleanliness.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

REPORT OF SEVERAL CASES OF CORNEAL COMPLICATIONS IN CONJUNCTIVITIS DUE TO THE KOCH-WEEKS BACILLUS.

Edward A. Shumway (*Philadelphia Medical Journal*, April 26) thinks that the Koch-Weeks bacillus conjunctivitis is becoming more common in Philadelphia. It frequently presents itself in a severe form and may be complicated with phlyctenules and ulcers of the cornea. The same types are very contagious and every precaution should be taken to prevent the spread of the affection, especially among school children. The author recommends the use of mild astringent lotions and applications of 2 per cent. solutions of nitrate of silver.

THE SPONTANEOUS CURE OF SENILE CATARACT.

Sidney Stephenson (*The Lancet*, April 26) reports the following case:

Female, aged 55 years, V. O. D. = fingers at 1 meter, unimproved. V.O. S.=fingers at 4 meters, with —9 D.S. $=^1/_6$. The right lens was opaque in its deeper parts, with a posterior polar opacity. The left lens showed a posterior polar opacity and opaque striæ in the cortex.

Floating opacities in the vitreous present in both eyes. Eight years later the patient was seen again.

V. O. D = fingers at 35 cm. Cataract nearly mature; V. O. S. with + 10 D. S. $=^2/_3$. The anterior chamber was deep, the pupil clear and black, the iris sluggish and tremulous, and the tension normal. The lens was dislocated and lying in the lower part of the vitreous chamber. The patient was seen for the third time two years later. The pupil of the right eye was found clear and black, the iris tremulous, the anterior chamber deep, and the lens dislocated downward into the vitrious humor. T. normal; V. with + 9 D. S. $=^2/_3$.

ATROPHY OF THE OPTIC NERVE AND ITS TREATMENT BY THE SUBCUTANEOUS INJECTION OF STRYCHNIA.

Hasket Derby (*Medical Record*, May 24) from his experience, draws the following conclusions:

1. Strychnia is a stimulant to the optic nerve. Even in normal eyes it slightly increases the acuteness of vision and widens the visual field. These effects are temporary.

2. In certain cases of optic nerve atrophy its local subcutaneous injection has, to say the least, coincided with an arrest in the progress of the disease, and has been followed by a somewhat increased acuteness of vision. Whether these effects are temporary or permanent, time and fuller statistics will show.

3. In a progressive case of this disease it is clearly our duty to state the above facts to the patient and allow him to take the treatment if he is so inclined.

4. The strychnia should always be administered in the temple, and by subcutaneous injection.

OCULAR AFFECTIONS ASSOCIATED WITH GLYCOSURIA, WITH ESPECIAL REFERENCE TO CENTRAL AMBLYOPIA.

Walter L. Pyle (*American Medicine*, April 19) draws the following conclusions:

1. Diabetes mellitus, or any disturbance of carbohydrate metabolism may affect any portion of the visual apparatus.

2. The ocular changes may be produced by chemic or physical means, or indirectly through the associated general debility.

3. They may vary in intensity from slight failure of accommodation to a formidable hemorrhagic retinitis and total optic nerve atrophy. Minor visual disturbances are often aggravated by fatigue or increased cardiac action, and may improve after rest or decrease of the vascular tension.

4. The intra-ocular disturbances may be exclusively unilateral, and there is never seen ophthalmoscopically inflammation of the optic nerve—important differences from the changes in albuminuria, syphilis and other blood dyscrasias.

5. Albuminuria does not infrequently co-exist with glycosuria, and the retinal changes may present a mixed picture, or a typical albuminuric retinitis may occur in diabetes.

6. Central amblyopia may exist in glycosuria entirely independent of the toxic influence of alcohol and tobacco, or in habitual users these may become a prominent factor in the causation. In these cases the initial lesion may be in the retinal ganglion cells; the inflammation of the "papillomacular fibers" of the temporal half of the optic nerve being secondary.

7. In chronic glycosuria, with the exception of cataract, ocular symptoms are often present when the constitutional and urinary symptoms are not marked.

8. The ocular symptoms may be the first to lead the patient to seek medical advice; therefore glycosuria should be suspected in the following conditions: (*a*) Premature presbyopia. (*b*) Unexplained mydriasis or cycloplegia. (*c*) Sudden change in the refraction; particularly, marked development or increase of myopia past middle age, without cataractous changes. (*d*) Intractable iritis. (*e*) Cataract in young or middle-aged persons. An examination of the urine is advisable even in cases of senile cataract, as the etiology has a bearing on the prognosis of operation. (*f*) Retinitis, particularly of the hemorrhagic variety. (*g*) Unexplained optic nerve atrophy. (*h*) Sudden and marked amblyopia, particularly central, without visible fundus changes.

9. The prognostic significance of ocular disturbance is not definitely established on account of the great difficulty in pathogenesis, severity and ultimate issue of the various forms of glycosuria. In well-marked cases many forms of eye lesions may improve and the patient's general health may be restored. The ocular symptoms do not progress according to any rules. Hemorrhagic retinitis and amaurosis preliminary to coma are the most serious symptoms. The ophthalmoscopic observation of greatest value in the prognosis is the state of the retinal vessels, as this may be taken as an index to the patient's general vascular condition.

A PLEA FOR THE EARLY TREATMENT OF SQUINT.

Nelson Miles Black (*Journal American Medical Association*, May 24) urges the necessity of treating strabismus as soon as it makes its appearance, for the following reasons:

1. In rare instances the squint disappears as the patient

grows older, but nearly always with vision much impaired in the deviating eye and binocular vision very imperfectly developed.

2. The earlier one can get a case after he has commenced to squint, the better the prognosis as to the parallelism of the eyes, binocular vision and visual acuity of each individual eye, because the case is in the developmental stage.

3. In regard to wearing glasses, the contrary is true. If a case can be obtained for treatment soon enough after the squint is noticed, the glasses, in the majority of cases, can be laid away about or soon after puberty, being only needed for close application of the eyes, except of course in cases of high hyperopia, myopia or astigmatism.

He agrees with Mr. Claude Worth of London regarding the etiology of squint, *i. e.*, "that the potential factor in a cause of squint, of course taken together with the several other etiologic factors, as hyperopia, myopia, anisometropia, congenital amblyopia, fundus changes, changes in the refractive media, heredity, local changes in an ocular muscle, etc., is the defective or non-development of the fusion sense."

Mr. Worth has determined that the fusion sense is fully developed by the sixth year; after that it is almost impossible to develop it.

The factors to be dealt with in every case of strabismus are:

1. The deformity.
2. The suppressed vision of the deviating eye.
3. The more or less amblyopic condition of the deviating eye in the majority of cases.
4. The refractive errors.
5. The fusion sense.

For the maintenance of fixation, and to prevent deterioration of vision in the deviating eye, the author bandages the good eye, or keeps it under the influence of a mydriatic. When there is ametropia he orders the proper correction as early as eighteen months. The development of the fusion faculty is accomplished by means of Worth's amblyoscope, and, after the visual axes have become nearly or quite parallel, the stereoscope. If, after the fusion faculty is well developed, the deviation still exists, he advises operating.